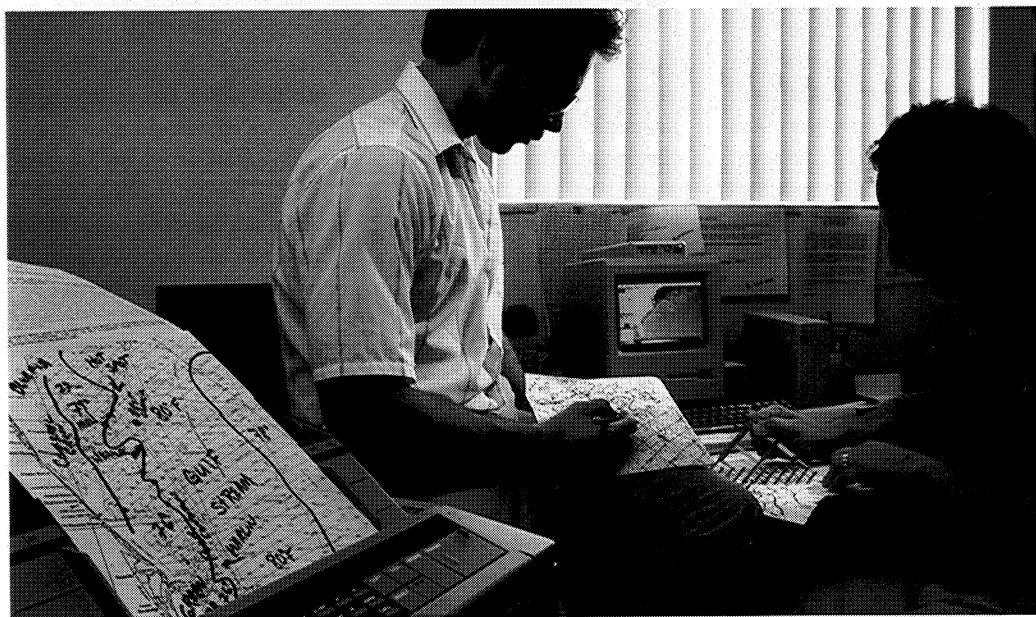


Fishing Forecasts

At right, Captain Jerry Coleman of the Florida Keys based charter fishing boat *Paradise* is looking over a ROFFS chart that offers advice as to steering clients to where the fish are—and hopefully sooner than the competition.

ROFFS stands for Roffer's Ocean Fishing Forecasting Service, Inc., Miami, Florida. It is operated by oceanographer Dr. Mitchell Roffer, who describes it as a high technology small business providing fish-location assistance to commercial, recreational and professional tournament fishermen. Roffer combines satellite and computer technology with oceanographic information from several sources to produce frequently updated charts—sometimes as often as 30 times a day—showing clues to the location of marlin, sailfish, tuna, swordfish and a variety of other types. He also provides customized ROFFS forecasts for racing boats and the shipping industry, along with seasonal



forecasts that allow the marine industry to formulate fishing strategies based on foreknowledge of the arrival and departure times of different migratory fish.

Fish are somewhat predictable, says Roffer. From research conducted over his 10 years with the University of Miami's Rosenstiel School for Marine and Atmospheric

Science, he concluded that specific ocean conditions—such as temperature gradients, the color and biological quality of the water, or movements of ocean currents—influence the whereabouts of fish concentrations. But as ocean conditions change, the fishes' "preferred habitats" change, thus the need for frequently updated

forecasts.

ROFFS provides what are essentially customized fisheries oceanographic maps overlaid on nautical charts. The service, says Roffer, offers marine operators greater productivity, decreased operating expenses and larger profits. A lot of people seem to agree; ROFFS customers, serviced by facsimile systems, telephone coded messages, computer-based electronic

mail or marine radio, stretch from Canada to the Gulf Coast, from the Caribbean down to South America.

Above, Roffer (in red) and an assistant are incorporating satellite imagery into a ROFFS chart. A portion of the completed chart is shown at right; it shows oceanographic information along with predictions of where

baitfish, tuna and marlin will be during the following 24-36 hours.

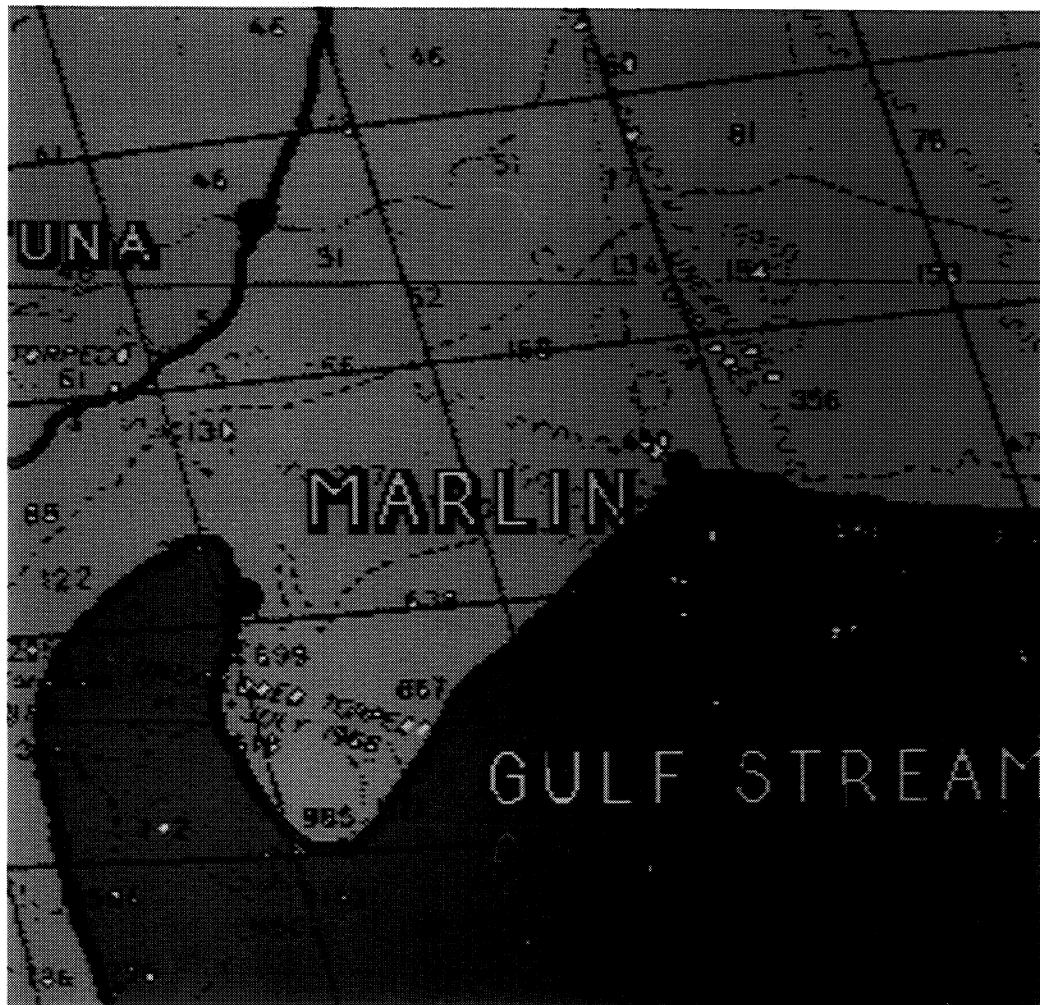
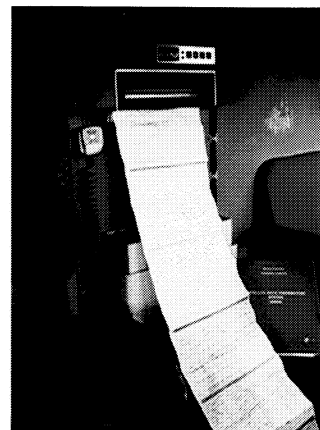
The ROFFS service exemplifies the potential for benefit to marine industries from satellite observations of the oceans. NASA is developing technology toward a possible ocean monitoring system of the 1990s that would offer such broad benefits as marine weather and climate prediction, maritime safety,

improved ship design and ship routing techniques, and, of course, an information service for directing fishermen to most productive waters.

As a preliminary, NASA conducted a mid-1980s Fisheries Demonstration Program, a research/technology transfer effort by Jet Propulsion Laboratory in cooperation with the National Oceanic and Atmospheric Administration (NOAA),

the U.S. Navy and Coast Guard, Scripps Institution of Oceanography, and the Western Fishing Boat Owners Association, San Diego, California.

The program employed ocean surface data from ships and buoys, plus data from satellites—including NASA's specially instrumented Nimbus 7—and meteorological satellites operated by NOAA and the



Department of Defense—to create “fisheries aid” charts. The charts incorporated a broad set of ocean observations, including data provided by Nimbus 7 on “color breaks,” areas of sharp changes in ocean color usually associated with fish concentrations. The charts were broadcast daily to 35 participating fishermen whose boats were equipped with radio-facsimile recorders such as the one shown above.

The program successfully demonstrated that satellite data, in particular ocean color delineation, combined with surface acquired data, can help commercial fishermen select strategies for more efficient and more economical operations. Among participating fishermen, the most notable results reported were reduced search time and substantial fuel savings. ▲